HEALTH ADVISORY

GUIDELINES FOR CONSUMPTION OF FISH AND SHELLFISH FROM TOMALES BAY (MARIN COUNTY)

October 2004

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EXECUTIVE SUMMARY

Sampling and analysis of fish and shellfish from Tomales Bay were conducted under the Coastal Fish Contamination Program, a state program designed to monitor the concentrations of chemical contaminants in fish and shellfish that sport fishers catch in California nearshore waters. This program was designed to provide data for the assessment of human health risks from consumption of these fish. An evaluation of the results from Tomales Bay showed the main chemical of concern to be methylmercury, the primary form of mercury in fish.

Mercury is a heavy metal that can be toxic to humans and other organisms. Mercury occurs naturally in the environment, and is also redistributed in the environment as a result of human activities such as mining and the burning of fossil fuels. Once mercury is released into the environment, it cycles through land, air, and water. In aquatic systems, it undergoes chemical transformation to the more toxic organic form, methylmercury, which accumulates in fish and other organisms. More than 95 percent of the mercury found in fish occurs as methylmercury. Consumption of fish is the major route of exposure to methylmercury in the United States. The critical target of methylmercury toxicity is the nervous system, particularly in developing organisms such as the fetus and young children. Significant methylmercury toxicity can occur to the fetus during pregnancy even in the absence of symptoms in the mother. (For more information on mercury, see Appendix II.)

In 1985, the United States Environmental Protection Agency (U.S. EPA) set a reference dose (RfD, that is the daily exposure likely to be without significant risk of deleterious effects during a lifetime) for methylmercury of $3x10^{-4}$ milligrams per kilogram of body weight per day (mg/kg-day), based on central nervous system effects (ataxia, or loss of muscular coordination; and paresthesia, a sensation of numbness and tingling) in adults. This RfD was lowered to $1x10^{-4}$ mg/kg-day in 1995 (and confirmed in 2001), based on developmental neurologic abnormalities in infants exposed *in utero*. Because the Office of Environmental Health Hazard Assessment (OEHHA) finds convincing evidence that the fetus is more sensitive than adults to the neurotoxic effects of mercury, but also recognizes that fish can play an important role in a healthy diet, OEHHA chooses to use both the current and previous U.S. EPA reference doses for two distinct population groups. In this advisory, the current RfD based on effects in infants will be used for women of childbearing age and children aged 17 years and younger. The previous RfD, based on effects in adults, will be used for women beyond their childbearing years and men.

Based on a preliminary review of initial data from Tomales Bay, an interim health advisory was issued by the Marin County Department of Health and Human Services, in consultation with OEHHA, on December 4, 2000 (Appendix I). This report contains a description of a more comprehensive evaluation using additional data, and provides a state fish consumption advisory for Tomales Bay.

Mercury concentrations in fish and shellfish from Tomales Bay were compared to guidance tissue levels for methylmercury, which are designed so that individuals consuming no more than a preset number of meals should not exceed the RfD for this chemical. Sufficient data were available to set consumption guidelines for California halibut, redtail surfperch, shiner surfperch, jacksmelt, leopard shark, brown smoothhound shark, Pacific angel shark, bat ray, and red rock crab. A comparison of limited data for pile surfperch to data for other surfperch species was used to include this species in the advisory.

Evaluation of data and comparison with guidance tissue levels for methylmercury indicated that development of a fish consumption advisory was appropriate for Tomales Bay. Consumers should be informed of the potential hazards from eating fish from this water body, particularly those hazards relating to the developing fetus and children. All individuals, especially women of childbearing age and children aged 17 years and younger, are advised to limit their fish consumption to reduce methylmercury ingestion to a level as close to the reference dose as possible. To help sport fish consumers achieve this goal, OEHHA has developed the advisory below for Tomales Bay. Meal sizes should be adjusted to body weight as described in the advisory table.

For general advice on how to limit your exposure to chemical contaminants in sport fish (*e.g.*, eating smaller fish of legal size), see the California Sport Fish Consumption Advisories (http://www.oehha.ca.gov/fish.html) or Appendix III. Site-specific advice for other California water bodies can be found online at: http://www.oehha.ca.gov/fish/so_cal/index.html. It should be noted that, unlike the case for many organic contaminants, various cooking and cleaning techniques will not reduce the methylmercury content of fish.

HEALTH ADVISORY FOR TOMALES BAY

Fish are nutritious, providing a good source of protein and other nutrients, and are recommended as part of a healthy, balanced diet. As with many other kinds of food, however, it is prudent to consume fish in moderation and to make informed choices about which fish are safe to eat. OEHHA provides this consumption advice to the public so that people can continue to eat fish without putting their health at risk.

TOMALES BAY FISH AND SHELLFISH CONSUMPTION GUIDELINES	
WOMEN OF CHILDBEARING AGE AND CHILDREN AGED 17 YEARS AND YOUNGER EAT NO MORE THAN:	
DO NOT EAT	ALL SHARKS including brown smoothhound shark, leopard shark, and Pacific angel shark
ONCE A MONTH	Bat rays ***OR***
ONCE A WEEK	California halibut; redtail, pile, or shiner surfperch; or red rock crab ***OR***
3 TIMES A WEEK	Jacksmelt
WOMEN BEYOND CHILDBEARING AGE AND MEN EAT NO MORE THAN:	
ONCE A MONTH	Brown smoothhound sharks or leopard sharks ***OR***
ONCE A WEEK	Pacific angel sharks or bat rays ***OR***
3 TIMES A WEEK	California halibut; redtail or pile surfperch; or red rock crab ***OR***
UNRESTRICTED	Jacksmelt or shiner surfperch
***MANY OTHER WATER BODIES ARE KNOWN OR SUSPECTED TO HAVE ELEVATED MERCURY LEVELS.** If guidelines are not already in place for the water body where you fish, women of childbearing age and children aged 17 years and younger should eat no more than one sport fish meal per week and women beyond childbearing age and men should eat no more than three sport fish meals per week **from any location**. **EAT SMALLER FISH OF LEGAL SIZE.** Fish accumulate mercury as they grow. **DO NOT COMBINE FISH CONSUMPTION ADVICE.** If you eat multiple species or catch fish from other water bodies, the recommended guidelines for different species and locations should not be combined. For example, if you eat a meal of fish from the one-meal-per-month category, you should not eat another fish species containing mercury for at least one month. **SERVE SMALLER MEALS TO CHILDREN. MEAL SIZE IS ASSUMED TO BE EIGHT OUNCES FOR A 160-POUND ADULT.** If you weigh more or less than 160 pounds, add or subtract 1 oz to your meal size, respectively, for each 20-pound difference in body weight.	

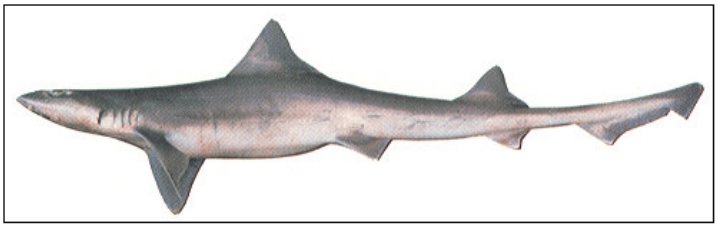
CONSIDER YOUR TOTAL FISH CONSUMPTION. Fish from many sources (including stores and restaurants) can contain elevated levels of mercury and other contaminants. If you eat fish with lower contaminant levels (including commercial fish) you can safely eat more fish. The American Heart Association recommends that healthy adults eat at least two servings of fish per week. Shrimp, king crab, scallops, farmed catfish, wild salmon, oysters, tilapia, flounder, and sole generally contain some of the lowest levels of mercury.

This advisory does <u>NOT</u> apply to commercial oysters, clams, and mussels from Tomales Bay; elevated levels of mercury have not been found in commercially grown shellfish.

TOMALES BAY FISH AND SHELLFISH SPECIES

NOTE: Images are not to scale.

Brown smoothhound shark *(Mustelus henlei)*

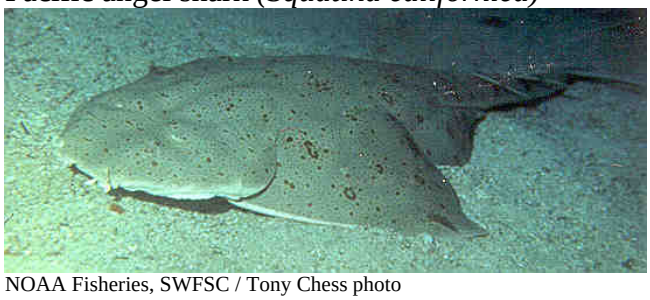


California Department of Fish and Game

Leopard shark *(Triakis semifasciata)*

NOAA Fisheries, SWFSC

Pacific angel shark *(Squatina californica)*



NOAA Fisheries, SWFSC / Tony Chess photo

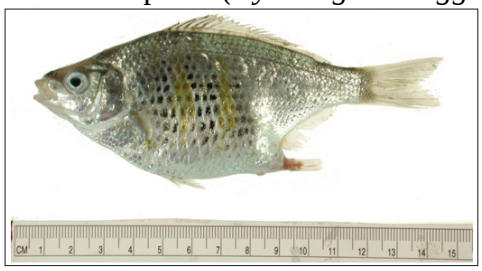
Bat ray *(Myliobatis californica)*

Photo by Daniel W. Gotshall

California halibut *(Paralichthys californicus)*

Source: http://www.insidesportfishing.com

Shiner surfperch *(Cymatogaster aggregata)*



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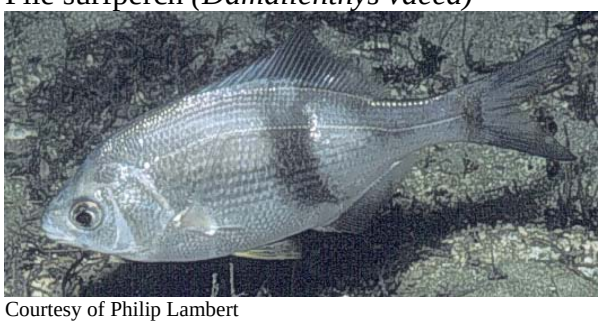
Redtail surfperch *(Amphistichus rhodoterus)*

California Department of Fish and Game

Pile surfperch *(Damalichthys vacca)*



Courtesy of Philip Lambert

Jacksmelt *(Atherinopsis californiensis)*

Aquarium of the Bay

Red rock crab *(Cancer productus)*

Glenn and Martha Vargas © California Academy of Sciences